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## SUMMARY

Faba bean (*Vicia faba* L.) is an important crop which can be used as pulse, vegetable, fodder, green manure and as a cover crop. Faba bean seeds are rich in protein content (28%) and carbohydrate (58%); hence the crop is an important source of protein and energy for human. Also, the crop is essential in farming system to increase soil fertility where it is an important protein supplier to the soil. In Egypt, faba bean occupied an area of about 157.000 feddan with an average seed yield 9.2 ardab/fed (from 2010 to 2014). Therefore a breeding and distributing faba bean variety tolerant to *Orobanche* has become a must.

The field experiments of this investigation were carried out at Sides Research Station (Beni-Suef Governorate), Agriculture Research Center (ARC) during 2010/2011 and 2011/2012 seasons. Twenty faba bean (*Vicia faba* L.) genotypes were used in this study *i.e.* fourteen promising *Orobanche* tolerant lines and six cultivars (three tolerant *viz.*; Giza 843, Giza 429 and Misr 1 and three susceptible *viz.*; Giza 40, Giza 2 and Nubaria 1). Two experiments were carried out in this investigation with three growing dates, *viz.* 20<sup>th</sup> October, 5<sup>th</sup> November and 20<sup>th</sup> November were planted in 2010/2011 and 2011/2012 seasons. The first experiment was conducted at Sides Research Station under naturally infested field with *Orbanche* and the second experiment was at free field. A randomized complete block design with four replications was used; each plot consisted of two ridges, 3m length and 60 cm apart (plot

size = 3.6 m<sup>2</sup>). The seeds were sown in the two sides of the ridge in 2-seeds hill distanced 20 cm. All recommended agricultural practices for faba bean production were adopted at the proper time. Insects were controlled chemically when needed according to recommendations. Studied characters were days to 50 % flowering, days to 95% maturity, plant height (cm), number of branches/plant, number of pods /plant, number of seeds /plant, seed yield /plant (g), 100-seeds weight (g), seed yield (Ton/Fed), number of *Orobanche* spikes/m<sup>2</sup> and dry weight of *Orobanche* spikes/m<sup>2</sup> (g)

**Results are summarized as follows:**

- 1- Mean squares due to growing dates for infested *Orobanche* field were highly significant for all studied traits in both two seasons; also, mean squares due to (genotypes x growing dates) interactions were highly significant for all studied traits. *Orobanche* for free field mean squares due to growing dates were highly significant for all studied traits in both two seasons, except number of pods per plant at 2011/2012 seasons. The mean squares due to genotypes were highly significant for all studied traits in both two seasons and mean squares due to genotypes x growing dates interactions were highly significant for all studied traits.
- 2- The first growing date (20<sup>th</sup> Oct.) gave the minimum number days to 50% flowering (45.6 days) under free *Orobanche* field and

(43.3 days) under infested *Orobanche* field in 2010/2011 season, compared with the other two growing dates for free and infested field. Genotypes X-1719 and X-1721 was the earliest flowering faba bean under *Orobanche* free field (47.2 and 47.3 days). While genotypes X-1720, X-1723 and X-1714 were the earliest flowering faba bean under *Orobanche* infested field (44.0, 44.3 and 45.1 days) in 2010/2011 season. The interaction between growing date and genotypes (GxD) was significant in 2010/2011 season under both free and infested fields. Under *Orobanche* free field genotypes X-1719, X -1721, X-1714, X-1723 and Giza 843 were among the early flowering faba bean genotypes under the first growing date (20<sup>th</sup> Oct. ) it gave ( 42.5, 42.5, 43.3, 43.3 and 43.5 days ) in 2010/2011 season respectively. While, such estimated was inferior in case of first growing date (20<sup>th</sup>Oct.) under *Orobanche* infested fields, genotypes X- 1715, X-1720, X-1714 and Giza 40 were among the early flowering faba bean genotypes (39.5, 39.8, 40.0 and 40.8 days) in 2010/2011

3- The first growing date (20<sup>th</sup> Oct.) gave the minimum number days to 50% flowering (45.4 days) under free *Orobanche* field and (43.8 days) under infested *Orobanche* field. Compared with the other two growing dates for free and infested field. Genotypes X-1722, X-1719 and Giza 2 gave (46.8, 47.3 and 47.3days) under *Orobanche* free field in 2011/2012 season. The genotypes X-

1720, X-1721 and X-1719 gave (45.4, 45.5 and 45.7 days) under *Orobanche* infested field in 2011/2012 season. The interaction between growing date and genotypes (GxD) was Significant in 2011/2012 season under both free and infested field. Genotypes X-1723, X-1719, X-1720 and Giza 40 gave (42.5, 43.0, 43.3 and 43.5 days) under *Orobanche* free field in the first growing date (20<sup>th</sup> Oct.) respectively. The same treatments 2011/2012 Genotypes X-1714, Giza 843, X-1723 and X-1722 gave (40.3, 40.5, 40.8 and 41.0 days) respectively. Under *Orobanche* infested field these results were in harmony with those obtained by.

- 4- The third growing date (20<sup>th</sup> Nov.) gave the minimum number of days to 95% maturity (145.4 days) under *Orobanche* free fields and (144.0 days) under *Orobanche* infested field. Compared with the other two growing dates for free and infested field. Genotypes X-1720, X-1718 and X-1714 were among the early maturity faba bean (149.3, 149.7 and 150.2 days) under *Orobanche* free field. While genotypes X-1716, X-1720, X-1721 and X-1718 were among the early maturity faba bean (149.7, 149.7, 149.7 and 150.2 days) under *Orobanche* infested field in 2010/2011 season. The interaction between growing date and genotypes (GxD) was Significant in 2010/2011 season under both free and infested field. Under free *Orobanche* field genotypes X-1721, X-1714, X-1716, X-1720 and X-1718 were among the earliest maturity faba



bean genotypes under the third growing date (20<sup>th</sup> Nov.) They gave (142.5, 142.8, 143.0, 143.0 and 143.3 days) respectively. While, such estimated was inferior in case of third growing date (20<sup>th</sup> Nov.) under *Orobanche* infested field, and also genotypes X- 1720, X-1714, X-1715 and Giza 2 in 2010/2011 season respectively.

5- The third growing date (20<sup>th</sup> Nov.) gave the minimum number of days to 95% maturity (145.4 days) under *Orobanche* free field and (143.7) days) under *Orobanche* infested field in 2011/2012 season. Compared with the other two growing dates for free and infested field. Genotypes X-1716, X-1720 and X-1714 gave (149.5, 150.1 and 150.5 days) under *Orobanche* free field. The genotypes X-1718, X-1716, X- 1720, X- 1717 and X-1723 gave (148.9, 149.2, 149.2, 149.7 and 149.7 days) Under *Orobanche* infested field respectively. The interaction between growing date and genotypes (GxD) was significant under both free and infested field in 2011/2012 season. Under free *Orobanche* field genotypes X-1716, X-1720, X-1714, X-1719 and X- 1722 gave (141.8, 142.5, 142.8, 142.8 and 143.0 days) In 2011/2012 in the third growing date (20<sup>th</sup> Nov.) respectively. Under *Orobanche* infested field the earliest maturity faba bean genotypes in 2011/2012 season genotypes were X-1716, X-1718 and X-1720 gave (140.8., 141.3 and 141.3 days) in the third growing date (20<sup>th</sup>

Nov.) respectively. These results were in harmony with those obtained by

- 6- The first growing date (20<sup>th</sup> Oct.) gave the maximum plant height (cm) under *Orobanche* free field (132.0 cm.) in 2010/2011 season. And second growing date (5<sup>th</sup> Nov.) gave the maximum plant height (110.4 cm), under *Orobanche* infested field. Compared with the other two growing dates for free and infested field. Genotypes 1561/489/2002, 1563/506/2002 and X-1717 detected the highest plant (123.2, 121.3 and 120.7cm) in season 2010/2011, While genotype X-1717 gave the highest plant height (114.9 cm) in season 2010/2011, under *Orobanche* infested field. The interaction between growing date and genotypes (G X D) was Significant in 2010/2011 season under both free and infested *Orobanche* field. Under *Orobanche* infested fields genotypes X-1717, 1562/517/2002 and 1561/489/2002 possessed the tallest plant (119.2, 121.3 and 125.8 cm) under the second growing date (5<sup>th</sup> Nov.) in 2010/2011 season respectively. While, such estimated was inferior in case of first growing date (20<sup>th</sup> Oct.) under *Orobanche* free field, and also genotypes X- 1722, X-1717 and X-1714 gave the maximum plant height (136.3, 137.1 and 137.9 cm) in 2010/2011 season.
- 7- The second growing date(5<sup>th</sup> Nov.) gave the maximum plant height (111.0 cm ) under *Orobanche* infested fields, compared with the

other two growing dates for free and infested field. Genotypes X-1717, X-1723 and 1561/489/2002 gave the highest plant height (120.8, 120.4 and 120.1 cm) under free field in season 2011/2012. Under *Orobanche* infested field Genotypes X-1718 and 1563/506/2002 gave (111.8 and 112.2 cm) in season 2011/2012 respectively. The interaction between growing date and genotypes (G X D) was Significant in 2011/2012 season under both free and infested *Orobanche* field. Under *Orobanche* infested field Genotypes X-1715, X-1718 and 1563/506/2002 gave the highest plant height (118.7, 119.2 and 119.6 cm) in growing date (5<sup>th</sup> Nov.). The growing date (20<sup>th</sup> Oct.) in 2011/2012 season. Genotypes X-1714, X-1722 and X-1717 gave (132.4., 133.8 and 137.9 cm) respectively, under *Orobanche* free field.

- 8- The first growing date (20<sup>th</sup> Oct.) gave the maximum number of branches / plant (4.2.) under free field and second growing date (5<sup>th</sup> Nov.) gave the maximum number of branches / plant (3.7) under *Orobanche* infested field. Compared with the other two growing dates for free and infested field. Genotypes Nubaria 1, 1561/517/2002, 1582/550/2002 and X-1719 detected the highest number of branches / plant (4.6, 4.2, 4.1, and 4.0) in season 2010/2011. While genotypes Nubaria 1, X-1717 and X-1721 gave (3.6, 3.4 and 3.4) under *Orobanche* infested fields.

The interaction between growing date and genotypes (GxD) was Significant in 2010/2011 season under *Orobanche* free and infested fields. Under infested fields genotypes Nubaria 1, X-1721, X-1717 and Giza 2 detected the highest number of branches / plant under the second growing date (5<sup>th</sup> Nov.) it gave (4.7, 4.2, 4.2 and 4.1) in the first season 2010/2011 respectively. While, such estimated was inferior in case of first growing date (20<sup>th</sup> Oct.) under *Orobanche* free field, and also genotypes 1561/489/2002, X-1720 and Nubaria 1 gave the maximum number of branches / plant 4.9, 4.7, 4.7 in first season 2010/2011 respectively,

- 9- That the first growing date (20<sup>th</sup> Oct.) gave the maximum number of branches / plant (4.2.) under free field and second growing date (5<sup>th</sup> Nov.) gave the maximum number of branches / plant (3.8) under *Orobanche* infested field in 2011/2012 seasons. Compared with the other two growing dates for free and infested field. Genotypes Nubaria 1, 1563/506/2002, 1562/517/2002 and Giza 2 gave (5.1, 4.2, 4.2, and 4.0 ) in the second season 2011/2012 under *Orobanche* free field, The Genotypes Nubaria 1, 1563/506/2002 and 1582/550/2002 gave (4.6, 4.0 and 3.9) under *Orobanche* infested field respectively. The interaction between growing date and genotypes (GxD) was Significant in 2011/2012 season under *Orobanche* free and infested field.

Under infested field genotypes Nubaria 1, 1561/489/2002 and Giza 429 in the second growing date (5<sup>th</sup> Nov.) it gave (4.7, 4.3, and 4.2) in the second season 2011/2012 respectively. Under *Orobanche* free field genotypes Nubaria 1, 1563/506/2002, Giza 2 and Giza 429 in the second growing date (20<sup>th</sup> Oct.) it gave (5.9, 5.0, 5.0 and 4.9) in the second season 2011/2012 respectively.

- 10- The first growing date (20<sup>th</sup> Oct.) gave the maximum number of pods / plant under *Orobanche* free field (19.1), and the second growing date (5<sup>th</sup> Nov.) gave the maximum number of pods / plant (17.0) under *Orobanche* infested field in season 2010/2011. compared with the other two growing dates for free and infested field. Genotypes X- 1716, X- 1720 detected the highest number of pods / plant (23.1, 21.1) in 2010/2011 season Under *Orobanche* infested field genotypes X- 1716, X-1717 in 2010/2011 season gave (16.9, 15.5) respectively. The interaction between growing date and genotypes (GxD) was Significant in 2010/2011 season under both free and infested field. Under *Orobanche* infested field X- 1716 detected the highest number of pods / plant under the second growing date (5<sup>th</sup> Nov.) it gave (22.7) in the first season 2010/2011. While, such estimated was inferior in case of first growing date (20<sup>th</sup> Oct.) under *Orobanche*

free field, and also X- 1716, X- 1720 gave the maximum number of pods / plant (24.3, 22.8) in 2010/2011season Respectively.

11- The first growing date (20<sup>th</sup> Oct.) gave the maximum number of pods / plant under *Orobanche* free field (17.9) in 2011/2012 season, and second growing date (5<sup>th</sup> Nov.) gave the maximum number of pods / plant (13.9) under *Orobanche* infested field compared with the other two growing dates for free and infested field. Genotypes X-1716, X-1720 gave (20.3, 19.2) in 2011/2012 season, and genotype X- 1716 gave (17.0) pods / plant Under *Orobanche* free field in 2011/2012 season. The interaction between growing date and genotypes (GxD) was Significant in 2011/2012 season under both free and infested field. Under *Orobanche* infested field genotype X-1716 gave the highest Number of pods / plant in the second growing date (5<sup>th</sup> Nov.) it gave (17.4) in 2011/2012 season. Under *Orobanche* free field genotype X- 1716 in the second growing date (20<sup>th</sup> Oct.) it gave (21.7)

12- The first growing date (20<sup>th</sup> Oct.) gave the maximum number of seeds / plant under *Orobanche* free field (58.1) and the second growing date (5<sup>th</sup> Nov.) gave the maximum number of seeds / plant (51.0) under *Orobanche* infested field in 2010/211season. Compared with the other two growing dates for free and infested field. Genotypes X- 1716, X- 1722 and X- 1717 detected the

highest number of seeds / plant under free field (66.7, 65.1 and 62.6) and under *Orobanche* infested field genotypes X- 1716, X- 1717 gave (49.5, 44.9) in 2010/2011 season. The interaction between growing date and genotypes (GxD) was Significant in 2010/2011 season under both free and infested field. Under *Orobanche* infested field genotype X- 1716, X- 1717 and 1582/550/2002 detected the highest number of seeds / plant under the second growing date (5<sup>th</sup> Nov.) it gave (65.1, 61.9 and 61.7) While, such estimated was inferior in case of first growing date (20<sup>th</sup> Oct.) under *Orobanche* free field, and also genotype X- 1717, X- 1716 and X- 1718 gave the maximum number of seeds / plant (70.0, 69.6 and 67.2) in 2010/2011 season respectively.

- 13- The first growing date (20<sup>th</sup> Oct.) gave the maximum number of seeds / plant under *Orobanche* free field (54.1). and the second growing date (5<sup>th</sup> Nov.) gave the maximum number of seeds / plant (43.0) under *Orobanche* infested field in 2011/2012 season compared with the other two growing dates for free and infested field. Genotypes X-1716, X-1722 detected the highest number of seeds / plant under free field gave (60.8, 57.8) in 2011/2012 season. Under *Orobanche* infested field genotype X- 1716 gave (48.6). The interaction between growing date and genotypes (GxD) was Significant in 2011/2012 season under both free and infested field. Under *Orobanche* infested field genotype X- 1716

detected the highest number of seeds / plant under the second growing date (5<sup>th</sup> Nov.) it gave ((52.7)) in 2011/2012 season. Under *Orobanche* free field genotypes X- 1716, X- 1722 and X- 1718 in the first growing date (20<sup>th</sup> Oct.) it gave (61.7, 60.9 and 60.3) in 2011/2012 season, respectively.

14- The first growing date (20<sup>th</sup> Oct.) gave the maximum seed yield / plant (g) under *Orobanche* free field (46.0) the second growing date (5<sup>th</sup> Nov.) gave the maximum seed yield / plant (36.5) under *Orobanche* infested field compared with the other two growing dates for free and infested field. Under *Orobanche* free field genotypes Nubaria 1, X- 1716, X- 1722, X- 1720 and X- 1717 detected the highest seed yield / plant (g) (53.9, 52.3, 50.6, 47.4 and 47.1g) respectively. Under *Orobanche* infested field genotype X- 1716 gave (35.4g) in 2010/2011 season. The interaction between growing date and genotypes (GxD) was Significant in 2010/2011 season under both free and infested field. Under *Orobanche* free field genotype X-1717, X-1716, X- 1718, X-1720 and X-1722 detected the highest seed yield / plant under the first growing date (20<sup>th</sup> Oct.) they gave (57.1, 54.3, 52.8, 51.3 and 51.2g) in 2010/2011season. While, such estimated was inferior in case of second growing date (5<sup>th</sup> Nov.) under *Orobanche* infested field, and also genotype X- 1716 gave the maximum seed yield / plant (46.2g) in 2010/2011season.



15- The first growing date (20<sup>th</sup> Oct.) gave the maximum seed yield / plant (g) under *Orobanche* free field (42.3g) the second growing date (5<sup>th</sup> Nov.) gave the maximum seed yield / plant (30.8g) under *Orobanche* infested field compared with the other two growing dates for free and infested field. Under *Orobanche* free field genotype X-1716, X-1722 and X- 1720 gave (45.0, 44.3 and 43.5g) respectively. Under *Orobanche* infested field genotype X-1716 gave (34.6g) in 2011/2012 season. The interaction between growing date and genotypes (GxD) was Significant in 2011/2012 season under both free and infested field. Under *Orobanche* free field genotype X- 1722, X-1716 and X-1717 in the first growing date (20<sup>th</sup> Oct.) they gave (48.2, 47.7 and 46.7g) in the second season 2011/2012 respectively. Under *Orobanche* infested field genotype Giza 843, X- 1716 and X- 1722 in the second growing date (5<sup>th</sup> Nov.) they gave (37.9, 37.4 and 36.8 g) in the second season 2011/2012 respectively

16- The first growing date (20<sup>th</sup> Oct.) gave the maximum 100 - seed weight under *Orobanche* free field (79.4) in 2010/2011season. The second growing date (5<sup>th</sup> Nov.) gave the maximum 100 - seed weight (74.0g) under *Orobanche* infested field compared with the other two growing dates for free and infested field. Genotype Nubaria 1, X-1718, and X- 1721 detected the highest 100 - seed weight (94.1, 78.7 and 78.1g). Under infested

*Orobanche* field genotype Nubaria 1, X-1719 and X-1715 gave (85.7, 72.5 and 72.4g) in 2010/2011 season. The interaction between growing date and genotypes (GxD) was Significant in 2010/2011 season under both free and *Orobanche* infested field. Under infested *Orobanche* field genotypes Nubaria 1, X- 1718 and X-1721 detected the highest 100 - seed weight under the second growing date (5<sup>th</sup> Nov.) they gave (84.4, 74.1 and 74.0g) in 2010/2011 season. While, such estimated was inferior in case of first growing date (20<sup>th</sup> Oct.) under *Orobanche* free field, and also genotypes Nubaria 1, X- 1723 and 1562/517/2002 gave the maximum 100 - seed weight (96.4, 82.4 and 82.0g) in the first season 2010/2011 respectively.

17- The first growing date (20<sup>th</sup> Oct.) gave the maximum 100 - seed weight under *Orobanche* free field (78.1g) in 2011/2012 season. The third growing date (20<sup>th</sup> Nov.) gave (72.0g) in 2011/2012 season. Under *Orobanche* infested field compared with the other two growing dates for free and infested field. Under *Orobanche* free field genotypes Nubaria 1, X-1719, X-1720 and 1563/506/2002 gave (95.6, 77.2, 77.1 and 77.1g) respectively. Under *Orobanche* infested field genotype Nubaria 1, Misr 1 and Giza 843 gave (86.9, 73.3 and 73.3g) in 2011/2012 season respectively. The interaction between growing date and genotypes (GxD) was Significant for both season under both free

and *Orobanche* infested field. Under infested *Orobanche* field in the third growing date (20<sup>th</sup> Nov.) gave (88.1, 74.9 and 74.8g) in 2011/2012 season respectively. Under free *Orobanche* field genotypes Nubaria 1, X- 1723 and X- 1720 in the first growing date (20<sup>th</sup>Oct.) gave (96.3, 80.9 and 80.7g) in 2011/2012 season respectively.

18- The first growing date (20<sup>th</sup> Oct.) gave the maximum seed yield under *Orobanche* free field (2.998 ton/fed.) in 2010/2011 seasons. The second growing date (15<sup>th</sup> Nov.) gave the maximum seed yield (1.836 ton/fed.) in 2010/2011 season, under *Orobanche* infested field compared with the other two growing dates for free and infested field. Genotypes X-1716, X-1722 and X-1717 detected the highest seed yield (2.849, 2.780 and 2.763 ton/fed). Under *Orobanche* infested field's genotype X-1716 gave (1.851 ton/fed ) in 2010/2011 season respectively. The interaction between growing date and genotypes (GxD) was Significant 2011/2012 season under free and infested *Orobanche* field. Under *Orobanche* infested fields X-1716 detected the highest seed yield under the second growing date (5<sup>th</sup> Nov.), it gave (2.944 ton/fed) in season 2010/2011. While, such estimated was inferior in case of first growing date (20<sup>th</sup> Oct.) Under *Orobanche* free field genotypes X-1717, X-1716 and X-1722 gave the highest seed yield (3.322, 3.269 and 3.319 ton/fed) and X- 1716

gave the maximum seed yield (3.254 ton/fed) in 2010/2011 season respectively.

19- The first growing date (20<sup>th</sup> Oct.) gave the maximum seed yield under *Orobanche* free field (2.877 ton/fed.) in 2011/2012 season. On the other hand the second growing date (15<sup>th</sup> ov. ) gave the maximum seed yield (1.636 ton/fed.) in 2011/2012 seasons under *Orobanche* infested field compared with the other two growing dates for free and infested field. Genotypes X-1716 and X-1722 detected the highest seed yield (2.722 and 2.611 ton/fed) under *Orobanche* free field in 2011/2012 season. Under *Orobanche* infested field genotype X-1716 gave (1.600 ton/fed) in 2011/2012 season respectively. The interaction between growing date and genotypes (GxD) was Significant in 2011/2012 season under free and infested *Orobanche* fields. Under *Orobanche* infested field genotypes X-1716 and X-1722 detected the highest seed yield under the second growing date (5<sup>th</sup> Nov.), it gave ( 2.039 and 2.008 ton/fed ) in 2011/2012 season. Under *Orobanche* free field X- 1716 and X-1722 gave the maximum seed yield (3.254 and 3.236 ton/fed) in 2.11/2.12 season.

20- Promising genotype X1719 gave the lowest number of *Orobanche* spikes / m<sup>2</sup> (3.6) than the three tolerant genotypes, followed by X1718 (4.7) and X1714 (5.2) at the first season. In the second season, X1720 was the best genotype (1.9), followed

by X1714 (4.0) and 1715 (4.4). The third growing date (20 Nov.) gave the lowest number of *Orobanche* spikes /m<sup>2</sup> (4.0 and 3.3) at both growing seasons respectively. The interaction between growing dates and genotypes (GxD) on number of *Orobanche* (m<sup>2</sup>) were significant in two growing seasons,

21- Dry weight of *Orobanche* spikes were significantly affected by growing dates faba bean genotypes. The lowest values of dry weight of *Orobanche* were recorded at the late growing date (20<sup>th</sup> Nov.) among all tested genotypes in both seasons. On the other hand for all genotypes growing date on (20<sup>th</sup> Oct.) gave the highest values of *Orobanche* dry weight. The interaction between growing dates and genotypes (GxD) on *Orobanche* dry weight were significant in two growing seasons,

22- The magnitude of genotype ( $\delta^2_g$ ) phenotype ( $\delta^2_p$ ) and genotype  $\times$  growing date interaction ( $\delta^2_{gd}$ ) were considerably smaller under free *Orobanche* field than under *Orobanche* infested field for seed yield (0.03 Ton/Fed) for ( $\delta^2_g$ ) under *Orobanche* free field and (0.07 Ton/Fed) under *Orobanche* infested *e* field. For phenotype ( $\delta^2_p$ ) (0.04 Ton/Fed) under *Orobanche* free field and (0.09 Ton/Fed) under *Orobanche* infested field and genotype  $\times$  growing date interaction ( $\delta^2_{gd}$ ) (0.02 Ton/Fed) under *Orobanche* free field and (0.09 Ton/Fed) under *Orobanche* infested field.

Also, the same result for No. of pods/plant, No. of seeds/plant, 50% flowering and Seed yield /plant.

- 23- Broad-sense heritability ( $h^2$ ) estimates were generally high for all studied traits under both environments *Orobanche* free and infested field. The highest estimates of broad sense heritability ( $h^2$ ) under *Orobanche* infested field were obtained for 100-seed weight (98.09), number of pods/plant (84.64), number of seeds/plant (81.03), 50% flowering (82.96) and Seed yield /plant (84.68) in the first season 2010/2011. In the second season 2011/2012 the highest estimates of broad sense heritability ( $h^2$ ) 100-seed weight (97.15), number of pods/plant (91.31), number of seeds/plant (87.81), 50% flowering (92.89) and Seed yield /plant (90.23).
- 24- Genotypic and phenotypic coefficients of variation (GCV and PCV) estimates were generally smaller GCV than PCV for all studied traits under both environments *Orobanche* free and infested field except seed yield (Ton/Fed) under *Orobanche* infested field during 2011/2012 season.
- 25- Genetic advance of seed yield (Ton/Fed.) varied from (0.33) under *Orobanche* free field and (0.52) under *Orobanche* infested field in the first season, the same result for the second season (0.28) under *Orobanche* free field and (0.49) under *Orobanche* infested field.

**The conclusion from the results is as follows:**

- 1- The experimenting in different growing dates would provide more useful information for recommended to test *orobanche* experiments under delaying growing dates.
- 2- Growing date in 5<sup>th</sup> November and 20<sup>th</sup> November exhibited the lowest number of *orobanche*/plot and give the highest yield.
- 3- Two genotypes namely X-1716 and X1722, were the most promising in seed yield, grown in different dates for tolerance of *Orobanche* compared with the other three check cultivars tolerance of *Orobanche* Giza 429, Giza 843 and Misr 1 respectively. The genotypes would be exploited in faba bean breeding program.
- 4- Further research ought to be done on the promising genotypes under different locations for tolerance of *Orobanche crenata*.